MIBEst
Molecular Infection Biology Estonia
Research Capacity Building

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Molecular Infection Biology Estonia presents:

Conference „Ribosomes & Antibiotics“

21.- 22. June 2022 V Spa, Tartu

21. June 2022

9.30 Post-translational modulation of antimicrobial peptides and their interaction with the gut microbiota

Group leader **Björn Schröder** (*Umeå University & Molecular Infection Medicine Sweden)*

His research projects focus on how dietary and other factors influence the interaction between gut microbiota and the mucosal barrier (intestinal mucus and antimicrobial peptides). He investigates the relevance of this interaction in the context of diseases, such as inflammatory bowel disease and metabolic diseases.

10.15 Hidden secrets of class-2 release factor 3.

Professor emeritus **Måns Ehrenberg** (*Uppsala University)*

Ribosome, protein synthesis and antibiotics targeting the ribosome. His research group has focused mainly on the prokaryotic ribosome and bacterial protein synthesis. The aim is to understand the mechanisms of initiation of protein synthesis, elongation of proteins and accuracy in tRNA and release factor selection, termination of protein synthesis and recycling of ribosomes from termination back to initiation – and the effects of antibiotics on all these mechanisms, as well as the overall effect on the growth rate of the cells.

11.00 Inhibition of translation termination by antimicrobial peptides.

Distinguished professor **Alexander Mankin** (*University of Illinois at Chicago)*

The research in Mankin/Vázquez-Laslop lab is aimed on understanding fundamental mechanisms of protein synthesis and antibiotic action. The ribosome has the ability to monitor the sequence of the polypeptides it makes. It can recognize and respond to specific nascent peptide sequences. Functional interactions between the ribosome and the nascent peptide are used for the regulation of gene expression and may also facilitate protein folding and targeting. Macrolide antibiotics bind to the nascent peptide exit tunnel and are one of the topics of research.

11.45 – 12.15 Coffee break

12.15 The action of orthosomycin antibiotics is modulated by the incoming aminoacyl-tRNA and the nascent peptide.

Research professor **Nora Vázques-Laslop** (*University of Illinois at Chicago)*

The research in Mankin/Vázquez-Laslop lab is aimed on understanding fundamental mechanisms of protein synthesis and antibiotic action. They are investigating the molecular mechanisms of nascent peptide-sensing by the ribosome and studying the ribosomal response to regulatory sequences in the nascent peptides. One of the main topics is the mechanisms of action of the macrolide class of antibiotics

13.00 Early assembly intermediates in 50S ribosome assembly.
Executive Vice President, Research & Academic Affairs **Jamie Williamson** (*The Scripps Research Institute)*
Research on the structure and function of RNA and RNA-protein complexes, using a biophysical approach. Specialties: Expertise in NMR spectroscopy, X-ray crystallography, fluorescence, mass spectrometry. Research areas include: dynamics of ribosome assembly, dynamics of the bacterial proteome, rRNA modification in bacteria, yeast, and human cells, dynamics of HIV Gag assembly

13.45 – 14.45 Lunch break

14.45 Structural basis for the context-specific action of the classic peptidyl transferase inhibitors.
Associate professor **Yuri Polikanov** (*University of Illinois at Chicago)*
His research is focused on elucidating the structure and functions of the ribosome, understanding the basic principles of protein synthesis in bacteria, the modes of action of ribosome-targeting antibiotics, and mechanisms of drug resistance at a structural level. While the general process of protein synthesis is relatively well understood, several fundamental questions central to the ribosome structure, function and evolution remain obscure. Understanding these aspects of translation is greatly facilitated by the use of X-ray crystallography technique that provides a structural basis for the molecular mechanisms, by which the ribosome and associated translation factors (such as release factors) achieve their roles in protein synthesis.

15.30 The Mode-of-Action of Daptomycin – Lessons for Antibiotic Drug Discovery.
Professor **Hans-Georg Sahl** *(University of Bonn)*
His research has focused on mechanisms of antimicrobial action, Lipid II synthesis, Lantibiotics, and Nisin. He has participated in a number of multi-team research consortia on various aspects of basic research and translation of antibiotic compounds. This includes coordination of the Research Unit 'Post genomic strategies for Novel Antibiotic Drugs and Targets' sponsored by the German Research Foundation, and coordination of the translational unit 'Novel Anti-infectives' of the German Centre of Infection Research.

16.15 – 16.45 Coffee break

16.45 Eukaryotic ribosomal proteins forming intersubunit bridges - their role in translation elongation and processivity of ribosomes.
Professor **Tiina Tamm** *(University of Tartu)*
Since 2012, Tiina Tamm has focused her research on eukaryotic ribosome. Her research helps to understand the importance of ribosomal structural elements in ribosome functioning and biogenesis in eukaryotic cells.

17.05 – 17.30 Neuronal RNA granules are ribosome complexes stalled at the pre-translocation state.
Researcher **Arto Pulk** (*University of Tartu)*

He studies localized protein synthesis in neurons that is important for long-term memory formation and synaptic plasticity. He has studied the structure and function of bacterial ribosomes using cryo-electron microscopy and crystallography

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9.30 Single-cell Salmonella responses to antimicrobials in mouse tissues.
Professor **Dirk Bumann** (*University of Basel)*
His research focuses on persistent bacterial infections, mechanisms of pathogenesis, and antimicrobial therapy of bacterial infections. The research goal is to gain a comprehensive understanding of metabolic activities in pathogens and, on this basis, to develop and test experimentally new therapeutic approaches to infectious diseases.

10.15 Translation by an EF-G lacking GTPase activity enables gut colonization by commensal bacterium.
Professor **Eduardo Groisman** (*Yale University)*
He studies microbial pathogenesis and focuses on the mechanisms that enable bacteria to cause disease and to further human health. One of his research topics has been bacterial magnesium homeostasis, its impact on bacterial pathogenesis and antibiotic susceptibility.

11.00 – 11.30 Coffee break

11.30 Mechanisms of ribosome inhibition by context-dependent antibiotics.
Group leader at Inserm **Axel Innis** (*European Institute of Chemistry and Biology & University of Bordeaux)*
His research focuses on the bacterial ribosome, its role in the regulation of gene expression and its susceptibility to various antimicrobial agents. He studies how bacterial ribosome is affected by nascent proteins known as arrest peptides, antimicrobial peptides produced by the host immune response, and antibiotics that target the translational machinery.

12.15 Involvement of putative metal efflux protein YbeX in ribosomal metabolism.
PhD student **Ismail Sarigül,** (*University of Tartu)*
He is a PhD student in Tanel Tenson's group and studies ribosome assembly. His work is focused on different factors that affect bacterial ribosome assembly, degradation and homeostasis, the effect of ribosome assembly on bacterial physiology and antibiotic susceptibility.

12.40-13.40 Lunch break

14.05 Disparity between ribosomal proteins in Escherichia coli ribosomes and proteome.
Researcher **Kaspar Reier** (*University of Tartu)*

He is working in Jaanus Remme's lab. His research topic is stability and degradation of bacterial ribosomes, with a special focus on stability, degradation and exchange of ribosomal proteins.

14.30 Ribosomal RNA modifications are not just for "fine-tuning".
Researcher **Rya Ero** (*University of Tartu*)
She is a Postdoctoral researcher in Jaanus Remme's lab. Her research focuses on the functional study of ribosomal RNA modifications and their role in regulation of the protein synthesis.

14.55 (p)ppGpp controls stringent factors by exploiting antagonistic allosteric coupling between catalytic domains.
Group leader and senior lecturer **Vasili Hauryliuk** *(Lund University & University of Tartu)*
His research interests are molecular mechanisms and evolution of ribosomal protein synthesis and its regulation. The lab is using a combination of biochemical, microbiological, next-generation sequencing (ribosome profiling and 5PSeq) and structural (cryo-EM) approaches to tackle ribosome-associated and ribosome-independent RelA-SpoT Homologue (RSH) enzymes that control intracellular levels of alarmone nucleotide

15.40-16.10 Coffee

16.10 RelA-SpoT Homolog toxins pyrophosphorylate the CCA end of tRNA to inhibit protein synthesis.
Associate researcher **Tatsuaki Kurata** *(Lund University)*
He is a Postdoctoral researcher in Vasili Haurylius lab. His research focus is on Toxin-Antitoxin systems, alarmon synthesis, phage defense and mechanisms of antibiotic resistance.

16.55 – 17.40 SpoT-fying the the stringent response.
Associate professor **Abel Garcia-Pino** (*Free University of Brussels)*
He is a structural biologist who uses resolving structures of macromolecule complexes to understand their functions. Main interests: Toxin-Antitoxin systems, alarmone synthesis, protein structure, protein synthesis, stringent response